



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/SE97/01269  <b>(22) International Filing Date:</b> 11 July 1997 (11.07.97)  <b>(30) Priority Data:</b> 08/681,668                      29 July 1996 (29.07.96)                      US  <b>(71) Applicant:</b> TELEFONAKTIEBOLAGET LM ERICSSON (publ) [SE/SE]; S-126 25 Stockholm (SE).  <b>(72) Inventor:</b> LOO, William; 6 Labreche, Kirkland, Quebec H9J 3W6 (CA).  <b>(74) Agent:</b> TELEFONAKTIEBOLAGET LM ERICSSON (publ); Patent and Trademark Dept., S-126 25 Stockholm (SE).		<b>(81) Designated States:</b> AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, KE, KG, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KS, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).  <b>Published</b> <i>With international search report.</i> <i>With amended claims.</i>  <b>(88) Date of publication of the international search report:</b> 5 March 1998 (05.03.98)  <b>Date of publication of the amended claims:</b> 14 May 1998 (14.05.98)
<b>(54) Title:</b> METHOD OF FREEING A VOICE CHANNEL IN A RADIO TELECOMMUNICATIONS NETWORK  <b>(57) Abstract</b>  <p>A method is disclosed of freeing a voice channel in a congested first cell (Cell B) in a cellular telecommunication system upon demand and without dropping an ongoing call. The method begins by identifying a second cell (Cell D) that neighbors the congested first cell, identifying a first mobile station (M2) operating on a voice channel in the congested first cell near the boundary of the second cell, and forcing a handoff of the first mobile station from the congested first cell to the second cell, thereby freeing the voice channel. If the second cell is also congested, the method identifies a third cell (Cell E) neighboring the second cell and identifies a second mobile station (M3) operating in the second cell near the boundary of the third cell. The method then forces a handoff of the second mobile station from the second cell to the third cell, thereby freeing a second voice channel located in the second cell. Finally, the method forces a handoff of the first mobile station from the congested first cell to the second cell, utilizing the second voice channel, thereby freeing the first voice channel in the congested first cell.</p>		

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## AMENDED CLAIMS

[received by the International Bureau on 24 March 1998 (24.03.98);  
original claims 1-22 replaced by amended claims 1-21 (7 pages)]

1. A method of freeing an occupied voice channel  
in a congested first cell in a cellular telecommunication  
5 system upon demand and without dropping an ongoing call,  
said method comprising the steps of:  
identifying a first mobile station, said first mobile  
station operating on the occupied voice channel in the  
congested first cell;  
10 identifying a second cell, said second cell  
neighboring the congested first cell;  
receiving in the congested first cell, a request for  
a voice channel from a second mobile station; and  
forcing a handoff of the first mobile station from  
15 the congested first cell to the second cell when the  
occupied voice channel is requested by the second mobile  
station within the congested first cell, thereby freeing  
the occupied voice channel.
- 20 2. The method of freeing an occupied voice channel  
in a congested first cell in a cellular telecommunication  
system of claim 1 wherein the step of forcing a handoff  
of the first mobile station from the congested first cell  
to the second cell includes forcing the handoff when the  
25 second mobile station attempts to access the cellular  
telecommunication system within the congested first cell.
3. The method of freeing an occupied voice channel  
in a congested first cell in a cellular telecommunication  
30 system of claim 1 wherein the step of identifying a  
second cell neighboring the congested first cell includes  
measuring received signal strength between the first  
mobile station and a plurality of cells neighboring the  
congested first cell.
- 35 4. The method of freeing an occupied voice channel  
in a congested first cell in a cellular telecommunication

system of claim 3 wherein the step of measuring received signal strength between the first mobile station and a plurality of cells neighboring the congested first cell includes measuring the received signal strength at the  
5 first mobile station.

5. The method of freeing an occupied voice channel in a congested first cell in a cellular telecommunication system of claim 3 wherein the step of measuring received  
10 signal strength between the first mobile station and a plurality of cells neighboring the congested first cell includes measuring the received signal strength at the plurality of cells neighboring the congested first cell.

15 6. The method of freeing an occupied voice channel in a congested first cell in a cellular telecommunication system of claim 3 wherein the step of identifying a second cell neighboring the congested first cell includes identifying a cell neighboring the congested first cell  
20 with the highest measured received signal strength of the plurality of cells neighboring the congested first cell.

7. The method of freeing an occupied voice channel in a congested first cell in a cellular telecommunication system of claim 1 wherein the step of identifying a first  
25 mobile station operating in the congested first cell includes identifying a first mobile station operating in the congested first cell near a boundary of the second cell.

30 8. The method of freeing an occupied voice channel in a congested first cell in a cellular telecommunication system of claim 7 wherein the step of identifying a first mobile station operating in the congested first cell  
35 includes identifying a first mobile station with sufficient received signal strength from the second cell to maintain a call in the second cell.

9. The method of freeing a voice channel in a congested first cell in a cellular telecommunication system of claim 7 further comprising the steps of:

- identifying a third cell, said third cell neighboring  
5 said second cell;
- identifying a third mobile station, said third mobile station operating in said second cell;
- forcing a handoff of said third mobile station from  
said second cell to said third cell; and
- 10 directing said second mobile station to access said cellular telecommunication system as a directed retry through said second cell.

10. The method of freeing a voice channel in a congested first cell in a cellular telecommunication system of claim 7 wherein said step of forcing a handoff of said first mobile station from said congested first cell to said second cell includes forcing said handoff when said second mobile station roams into said congested  
15 first cell during a call.

11. The method of freeing a voice channel in a congested first cell in a cellular telecommunication system of claim 7 wherein said step of forcing a handoff  
25 of said first mobile station from said congested first cell to said second cell includes forcing said handoff before said cellular telecommunication system automatically performs a handoff of said first mobile station based on predetermined criteria.

12. A method of freeing an occupied voice channel in a congested first cell in a cellular telecommunication system upon demand and without dropping an ongoing call, said method comprising the steps of:

- 35 identifying a second cell, said second cell neighboring the congested first cell, said step of identifying a second cell comprising:

measuring received signal strength between a first mobile station operating in the congested first cell, and a plurality of cells neighboring the congested first cell; and

5 identifying a cell neighboring the congested first cell with the highest measured received signal strength of the plurality of cells neighboring the congested first cell;

10 determining that the occupied voice channel is needed by a second mobile station within the congested first cell; and

forcing a handoff of the first mobile station from the congested first cell to the second cell when the occupied voice channel is needed by the second mobile station, said step of forcing the handoff being performed before the cellular telecommunication system automatically performs a handoff of the first mobile station based on predetermined criteria.

20 13. A method of freeing a first voice channel in a congested first cell in a cellular telecommunication system upon demand and without dropping an ongoing call, said method comprising the steps of:

25 identifying a second cell, said second cell neighboring said congested first cell;

identifying a third cell, said third cell neighboring said second cell;

identifying a first mobile station, said first mobile station operating in said congested first cell;

30 identifying a second mobile station, said second mobile station operating in said second cell;

determining whether said second cell is congested;

35 forcing a handoff of said second mobile station from said second cell to said third cell upon determining that said second cell is congested, thereby freeing a second voice channel located in said second cell; and

forcing a handoff of said first mobile station from said congested first cell to said second cell, utilizing said second voice channel, thereby freeing said first voice channel in said congested first cell.

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14. The method of freeing a first voice channel in a congested first cell in a cellular telecommunication system of claim 13 wherein said step of identifying a third cell neighboring said second cell includes identifying a third cell that does not neighbor said congested first cell.

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15. The method of freeing a voice channel in a congested first cell in a cellular telecommunication system of claim 13 wherein said step of identifying a second cell neighboring said congested first cell includes measuring received signal strength between said first mobile station and a plurality of cells neighboring said congested first cell.

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16. The method of freeing a voice channel in a congested first cell in a cellular telecommunication system of claim 15 wherein said step of identifying a second cell neighboring said congested first cell includes identifying a cell neighboring said congested first cell with the highest measured received signal strength of said plurality of cells neighboring said congested first cell.

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17. The method of freeing a voice channel in a congested first cell in a cellular telecommunication system of claim 13 wherein said step of identifying a first mobile station operating in said congested first cell includes identifying a first mobile station operating in said congested first cell near a boundary of said second cell.

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18. The method of freeing a voice channel in a congested first cell in a cellular telecommunication system of claim 16 wherein said step of identifying a first mobile station operating in said congested first cell includes identifying a first mobile station with sufficient received signal strength from said second cell to maintain a call in said second cell.

19. The method of freeing a voice channel in a congested first cell in a cellular telecommunication system of claim 13 wherein said steps of forcing a handoff of said second mobile station from said second cell, and forcing a handoff of said first mobile station from said congested first cell include forcing said handoffs when an occupied voice channel is needed in said congested first cell by a third mobile station.

20. The method of freeing a voice channel in a congested first cell in a cellular telecommunication system of claim 19 wherein said step of forcing said handoffs when an occupied voice channel is needed in said congested first cell by a third mobile station includes forcing said handoffs before said cellular telecommunication system automatically performs said handoffs based on predetermined criteria.

21. A method of freeing a first voice channel in a congested first cell in a cellular telecommunication system upon demand and without dropping an ongoing call, said method comprising the steps of:

identifying a second cell, said second cell neighboring said congested first cell, said step of identifying a second cell comprising the steps of:

measuring received signal strength between a first mobile station operating in said congested first cell, and a plurality of cells neighboring said congested first cell; and



identifying a cell neighboring said congested first cell with the highest measured received signal strength of said plurality of cells neighboring said congested first cell;

5 identifying a third cell, said third cell neighboring said second cell, but not neighboring said congested first cell;

identifying a second mobile station, said second mobile station operating in said second cell, said second  
10 mobile station having sufficient received signal strength from said third cell to maintain a call in said third cell;

determining whether said second cell is congested;

forcing a handoff of said second mobile station from  
15 said second cell to said third cell upon determining that said second cell is congested, thereby freeing a second voice channel located in said second cell, said handoff of said second mobile station being forced before said cellular telecommunication system automatically performs  
20 said handoff of said second mobile station based on predetermined criteria; and

forcing a handoff of said first mobile station from said congested first cell to said second cell, utilizing  
25 said second voice channel, thereby freeing said first voice channel in said congested first cell, said handoff of said first mobile station being forced before said cellular telecommunication system automatically performs said handoff of said first mobile station based on predetermined criteria.